

# WAVE 2-Way Wireless Accessories and Adapters for Touch Panels

Instruction Manual



Control Panel Accessories

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# Introduction

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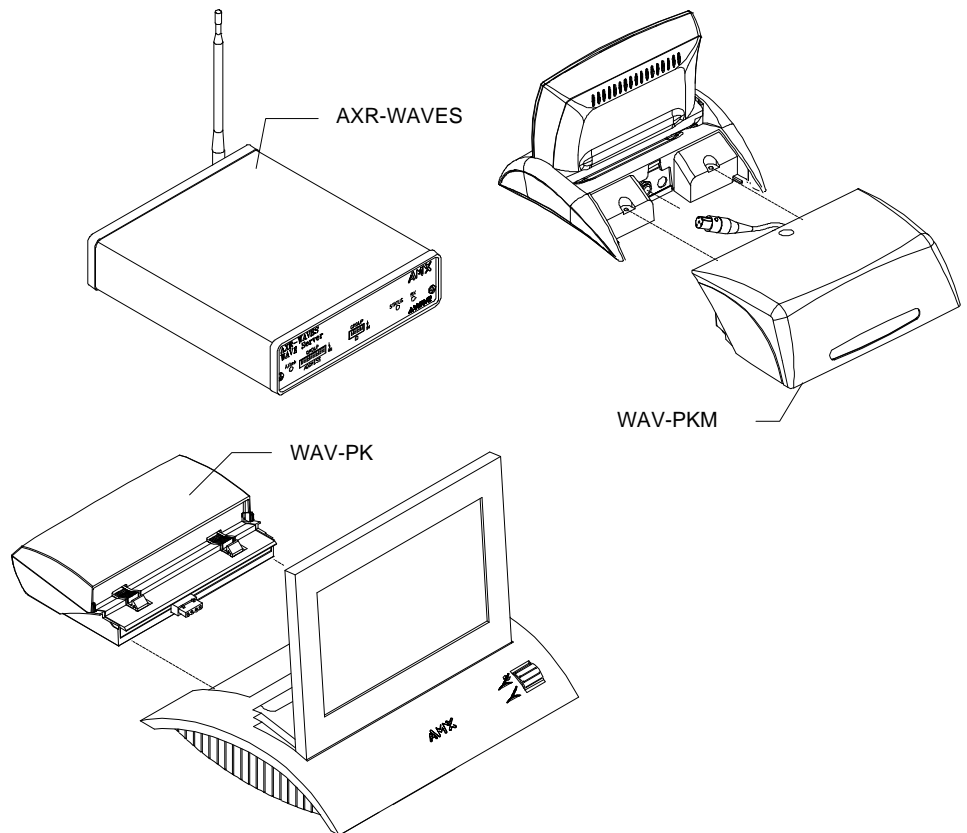
## Overview

The AXR-WAVES Wireless AXlink Virtual Emulator Server (Figure 1) is a 2-way Radio Frequency (RF) device employing spread spectrum communications. A single AXR-WAVES can communicate with up to 16 wireless TiltScreen touch panels equipped with WAV-PK or WAV-PKM Wireless Power Packs. The WAV-PK and WAV-PKM are designed to enable 2-way wireless mobility of full-sized and mini-touch panels, thus eliminating the need for permanent installation of a touch panel. Refer to the ViewPoint Touch Panel Cleaning, Charging, and Battery Replacement quick reference guide for more information on other products that use battery packs.

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**Figure 1**

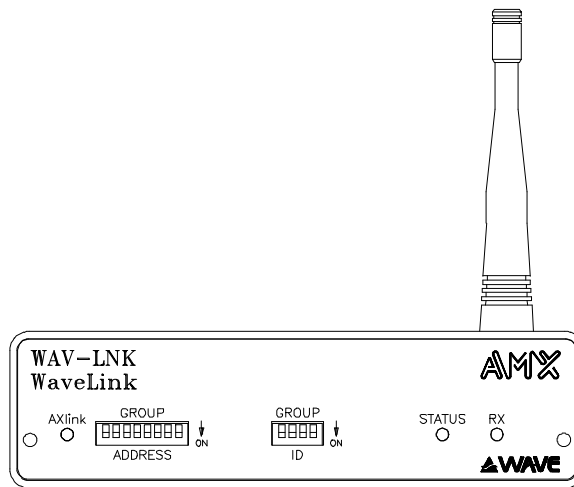
AXR-WAVES WAVE Server,  
WAV-PK, and WAV-PKM.



Additionally, the WAV-LNK WaveLink transceiver (Figure 2) may be used in conjunction with one or more WAV-PM modules when a UniMount or rack mounted touch panel is used in a remote, wireless application. The WAV-LNK is ideal for UniMount touch panels mounted in podiums or lecterns where cabling is of concern.

**Figure 2**

WAV-LNK transceiver



## Features

The major features for the AXR-WAVES, WAV-LNK, WAV-PK, and WAV-PKM are described in the following paragraphs. Additionally, information for the WAV-PM power module is provided.

## What's in this Manual

This manual comprises the following sections:

**Pre-Installation Settings** Describes how to set the GROUP ADDRESS and GROUP ID DIP switches.

**Installation** Describes how to install and wire the AXR-WAVES, WAV-PK, WAV-PKM, WAV-PM, WAV-BP, and WAV-BPM.

**Firmware Upgrade** Provides the disassembly and installation requirements for upgrading the AXR-WAVES, WAV-PK, and WAV-PKM firmware integrated circuits (ICs).

**Specifications** Briefly describes the AXR-WAVES, WAV-PK, WAV-PKM, WAV-PM, WAV-BP, and WAV-BPM specifications for each unit.

**Technical Support** Lists the telephone numbers to contact Sales and Technical Support.

## What's New

Updates to this manual include:

- Battery usage, safety warnings, and caution information
- Updated technical support information

All other revisions are identified by vertical margin bars as shown adjacent to this paragraph.

## AXR-WAVES

AXR-WAVES features include:

- 2-way RF communications with up to 16 TiltScreen touch panels equipped with wireless power packs
- 2-way communication via a 2.4 GHz frequency hopping, spread spectrum technology

## WAV-PK

WAV-PK features include:

- 2-way RF communications with an AXR-WAVES server
- Mobility for full-sized TiltScreen touch panels
- Integrated power management features for longer battery life
- Built-in antenna
- Rechargeable lead-acid battery (WAV-BP WavePack Battery)
- Lithium battery maintains the flash RAM

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### Note

The WAV-PK contains two small lithium batteries that will last approximately 5 years. The batteries are not user replaceable, and the WAV-PK must be returned to Panja for battery replacement.

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### Note

The most recharge cycles are available when the battery is recharged before the battery drains completely.

## WAV-PKM

WAV-PKM features include:

- 2-way RF communications with an AXR-WAVES server
- Mobility for Mini-TiltScreen Touch Panels
- Integrated power management
- Built-in antenna

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**Note**

The WAV-PKM contains two small lithium batteries that will last approximately 5 years.

The batteries are not user replaceable and the WAV-PKM must be returned to Panja for battery replacement.

- Rechargeable lead-acid battery (WAV-PKM Mini-WavePack Battery)
- Lithium battery maintains the flash RAM

***WAV-LNK WaveLink***

The WAV-LNK WaveLink transceiver features include:

- 2-way RF spread-spectrum communications with an AXR-WAVES server.
- Operates from an external power supply and/or one or more WAV-PM power modules.
- Integrated battery charge circuitry.
- Unit is rack-mountable using an optional AC-RK Accessory Rack Kit.
- Interface capabilities for up to 16 AXlink devices.

***WAV-PM WaveLink power module***

The WAV-PM WaveLink Power Module features include the following:

- Provides up to 3 amps of current
- Uses 2.3 AH, 12 VDC lead-acid battery (same as used in the WAV-PK)
- Built-in, fast-cycle charging circuitry
- Easy battery replacement
- Front panel battery charge level gauge
- Overload protection and indication
- Battery charging indicator
- Can be daisy-chained with other WAV-PM modules to provide a maximum 12 VDC @ 10 AMP for extended WAV-LNK operating time
- Rack mountable using the optional AC-RK Accessory Rack Kit

**Related Instruction Manuals**

These instruction manuals contain additional information that relates to the Wave 2-Way Wireless Accessories and Adapters for Touch Panels.

- [Black/White Mini-Touch Panels \(Firmware version G3 or higher\)](#)
- [Black/White Touch Panels \(Firmware version G3 or higher\)](#)
- [ViewPoint Touch Panel Cleaning, Charging, and Battery Replacement](#)

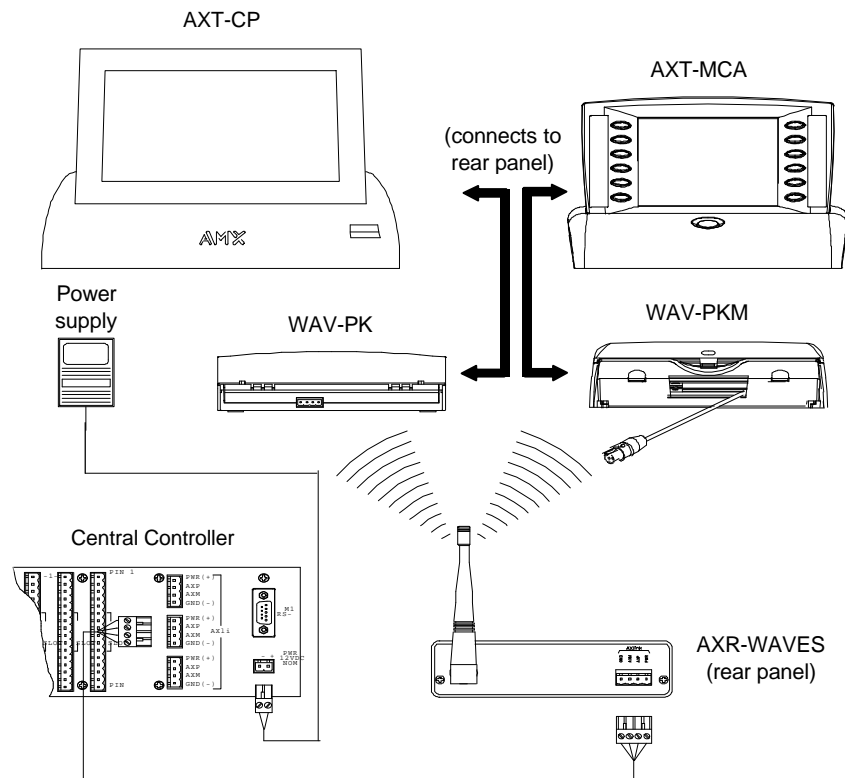


## Sample Product Application

The AXR-WAVES connects to a Central Controller and communicates with a wide variety of touch panels. The WAV-PK and WAV-PKM power packs connect to full-sized and mini-touch panels to provide mobility and communications with an AXR-WAVES. Figure 3 shows a sample control system using an AXR-WAVES communications configuration.

**Figure 3**

Sample Central Controller and  
AXR-WAVES communications  
application



## AXR-WAVES

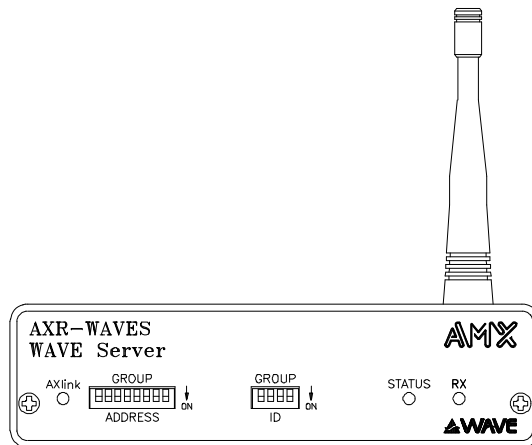
The AXR-WAVES front and rear panel controls and indicators are described in the following paragraphs.

### Front panel

The AXR-WAVES front panel provides an AXlink LED status indicator, GROUP ADDRESS DIP switch, GROUP ID DIP switch, STATUS LED, and RX LED indicator as shown in Figure 4.

**Figure 4**

AXR-WAVES front panel



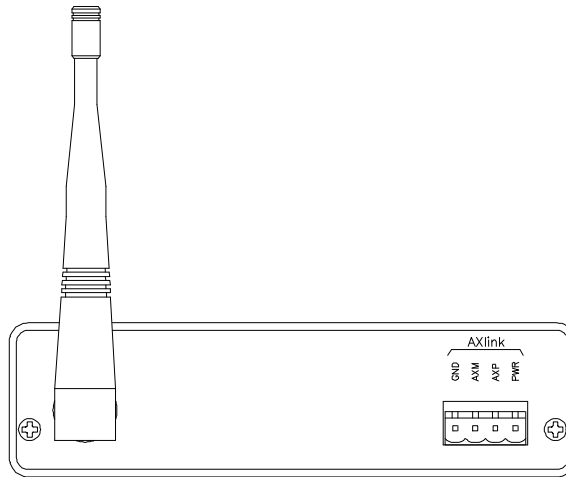
- **AXlink**—Green LED that blinks when there is AXlink communication activity. The green AXlink LED indicates the following power and data activity:
  - One blink per second: Power is active and AXlink data communication is functional.
  - Full on: Power is active and AXlink data communication is not functional.
- **GROUP ADDRESS**—Eight-position DIP switch sets the group address (0 through 255).
- **GROUP ID**—Four-position DIP switch sets the control group identification address (0 through 15).
- **STATUS**—Red LED flashes periodically during normal operation.
- **RX**—Red LED lights when the AXR-WAVES receives RF control data.

### ***Rear panel***

The rear panel has an RF antenna and a 4-pin AXlink bus connector. Figure 5 shows the AXR-WAVES rear panel.

**Figure 5**

AXR-WAVES rear panel



- **ANTENNA**—Right-angle, flexible, bi-directional RF antenna.
- **AXlink**—Four-pin (male) connector connects to the Central Controller to receive AXlink control data and 12 VDC power.

### **WAV-PK**

The WAV-PK full-sized TiltScreen touch panel controls and indicators are described in the following paragraphs.

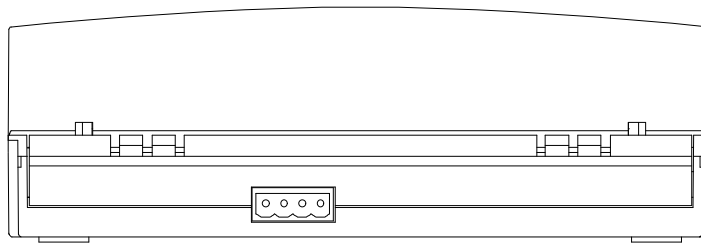
### ***Front panel***

The front of the WAV-PK power pack contains a connector that mates with the full-sized TiltScreen touch panels. This connector provides both power and data connections. Figure 6 shows the WAV-PK front panel and connector.

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**Figure 6**

WAV-PK power pack front panel and connector



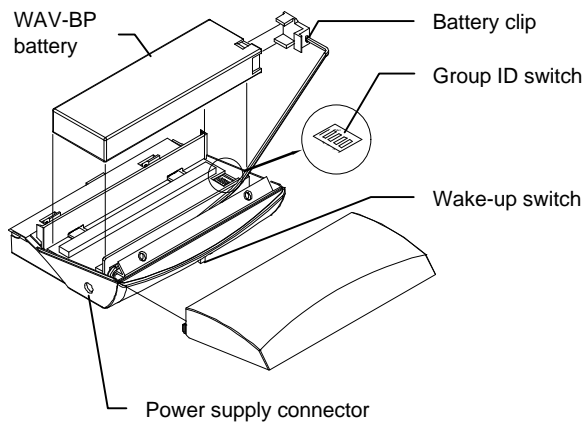
### ***Rear panel***

The WAV-PK rear panel provides a barrel power (plug-in) connector for operating or recharging of the unit. There is also a wake-up switch located in the center-rear of the WAV-PK. Figure 7 shows the rear of the unit and the power connector.

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**Figure 7**

WAV-PK rear panel



### **WAV-PKM**

The WAV-PKM Mini-TiltScreen touch panel controls and indicators are described in the following paragraphs.

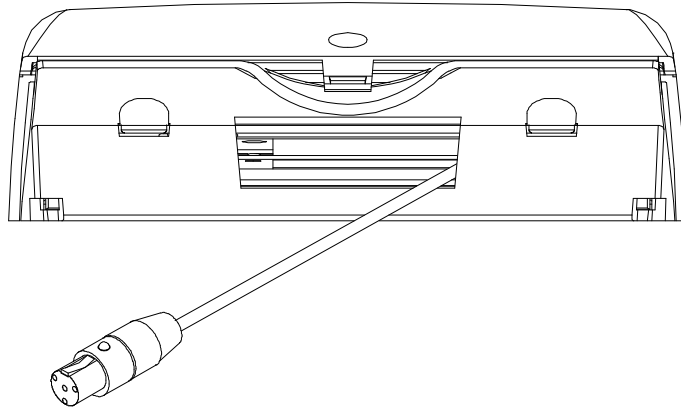
### ***Front panel***

The WAV-PKM power pack connects to the Mini-TiltScreen touch panel. Figure 8 shows a front view of the WAV-PKM and connector cable.

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**Figure 8**

WAV-PKM front panel



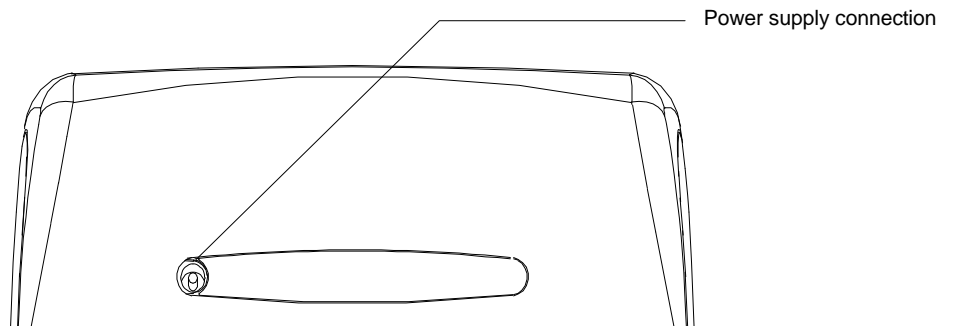
### ***Rear panel***

The WAV-PKM rear panel provides a power connector for operating or recharging of the unit. Figure 9 shows the rear of the unit and the power connector.

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**Figure 9**

WAV-PKM rear panel



### **WAV-LNK WaveLink**

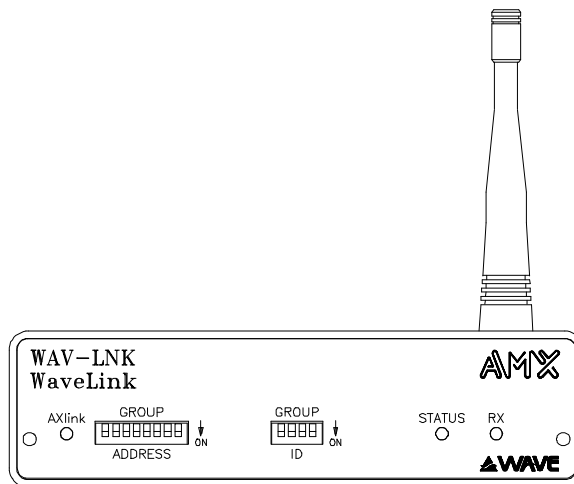
The WAV-LNK WaveLink transceiver provides an interface for up to 16 touch panels or similar AXlink type devices. The WAV-LNK communicates with the AXR-WAVES and allows connecting devices requiring AXlink communications. The following paragraphs describe the controls and indicators on the WAV-LNK front and rear panels.

### Front panel

Figure 10 shows the front panel for the WAV-LNK and its switches and indicators are described below.

**Figure 10**

WAV-LNK front panel



- **AXlink**—This LED lights when an active AXlink connection is established.
- **GROUP ADDRESS**—Eight-position DIP switch sets the group address (0 through 255).
- **GROUP ID**—Four-position DIP switch sets the control group identification address (0 through 15).
- **STATUS**—Red LED flashes during normal operation.
- **RX**—Red LED lights when the WAV-LNK receives RF control data.

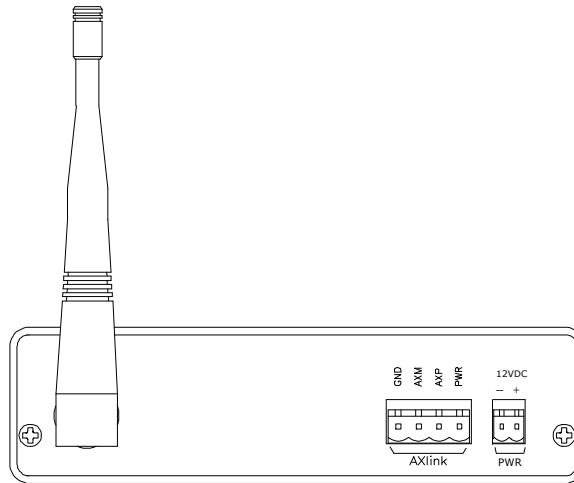
### Rear panel

Figure 11 shows the WAV-LNK rear panel and its connectors. They are:

- **AXlink**—The AXlink connector provides a 4-wire connection to any device (including a CardFrame equipped with an AXC-EM Enhanced Master controller) which uses AXlink signaling. This connection also provides power out to the connected devices.
- **PWR**—The PWR connector is used when connecting an external power supply, such as one or more WAV-PK power modules or a PS4.2 power supply.

**Figure 11**

WAV-LNK rear panel



### Optional WAV-PM WaveLink Power Module

The WAV-PM WaveLink Power Module provides additional wireless backup power to a WaveLink device. WAV-PMs can be daisy-chained to provide 12 VDC at up to 10 A. The following paragraphs identify and define controls and indicators for the optional WAV-PM WaveLink Power Module.

#### Note

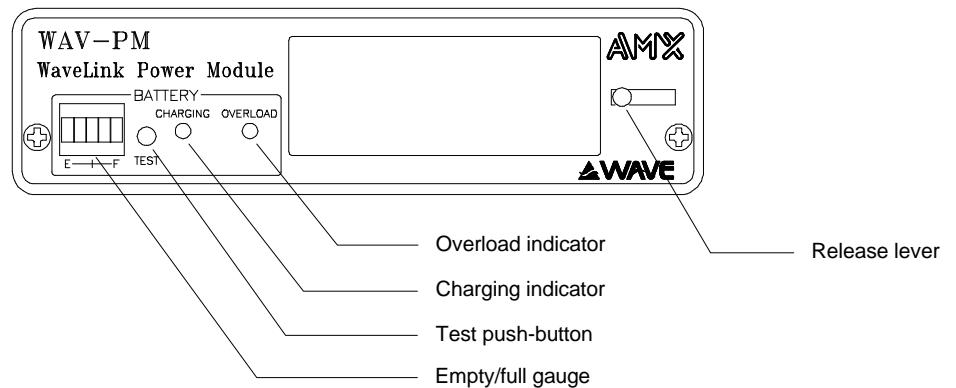
The WAV-PM WaveLink Power Module will only accept only the full-sized WAV-BP batteries.

#### Front panel

Figure 12 shows the WAV-PM front panel, and the following paragraphs define the controls and indicators.

**Figure 12**

WAV-PM front panel



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**Note**

While a battery is charging, the Empty/Full indicator does not show a valid reading.

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**Caution**

Ensure that the WAV-PM application environment does not require a greater supply current than the module can provide. If the system is overloaded, irreparable damage could occur to the module.

- **Empty/Full gauge**—The BATTERY indicator gauge (empty-full) provides a visual indication of the charge level of the battery currently being used. If the battery's charge is high, all left-to-right indicator lamps will be lit.
- **Test**—Pressing the TEST button displays an indication of the current battery's charge level on the front panel's Empty/Full gauge.
- **Charging**—The CHARGING indicator lights when the module is currently charging a battery. The indicator goes off when the battery is fully charged.
- **Overload**—The OVERLOAD indicator lights when the WAV-PM WaveLink Power Module is used in an application that requires more current/voltage than can be supplied by the module.
- **Battery Release**—The battery release lever, when pushed to the right, releases the battery from the module clasps and enables removal.

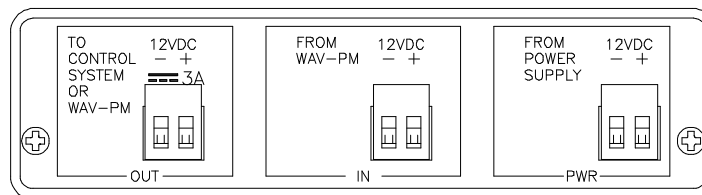
**Rear panel**

Figure 13 shows the WAV-PM WaveLink Power Module rear panel. Controls and indicators are defined as follows.

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**Figure 13**

WAV-PM rear view



- **OUT**—This is a 2-wire connector which provides a 12 VDC, 3 AMP output which can be connected to a WAV-LNK Control System or to another WAV-PM module.
- **IN**—A 2-wire connector for accepting 12 VDC input power from another WAV-PM module.
- **PWR**—When using power input from a separate 12 VDC power supply, connect to this 2-wire connector.



Power management

The Wave Packs incorporate advanced power management schemes that reduce overall power consumption. Power management is software-controlled by the individual touch panel program. The user tells the WavePack when to go into power conservation mode (sleep mode). Pressing the rear-mounted WAV-PK wake-up switch activates the WavePack.

The WAV-PK physically provides a wake-up switch on its rear panel. The WAV-PKM wakes up when someone touches the touch panel screen. Refer to the instruction manual supplied with your touch panel for detailed information.

Batteries

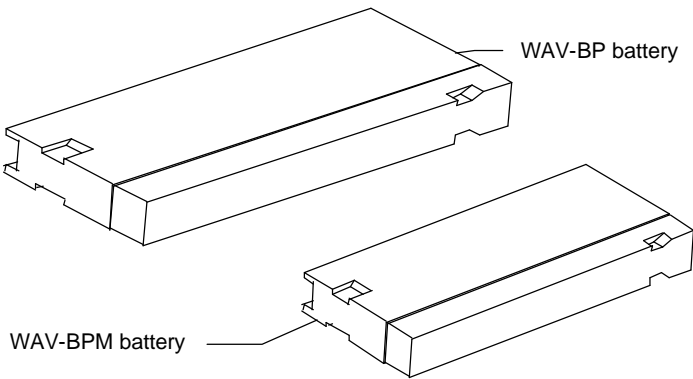
The batteries (Figure 14) used for the WAV-PK and WAV-PKM are rechargeable lead-acid batteries. There are two different sizes used, WAV-BP for the full-sized TiltScreen touch panels and WAV-BPM for the Mini-TiltScreen touch panels.

Figure 14  
WAV-PK and WAV-PKM batteries

**Caution**

Keep the following important safety considerations in mind when using the WAV-BP and WAV-BPM batteries:

- Do not incinerate.
- Do not directly connect the negative and positive terminals.
- Do not use with battery chargers other than the WAV-PK and WAV-PKM.



The recharge life of the lead-acid batteries is dependent on the discharge depth of the battery at the time of re-charge. See Figure 15 for charge cycle availability.

Figure 15  
Charge cycle availability

Charge cycle availability	
Discharge depth	Charge cycles available
100%	200
50%	450
30%	1200

### ***Safe handling and usage of the battery***

To prevent deterioration or damage to the battery:

- Do not use battery to power equipment other than the WAV-PK or WAV-PKM.
- Do not drop or subject the battery to strong physical shock.
- Do not use the battery below  $-10^{\circ}\text{C}$  ( $15^{\circ}\text{F}$ ) or above  $+40^{\circ}\text{C}$  ( $105^{\circ}\text{F}$ ). If the temperature exceeds this upper limit, a safety device automatically prevents operation of the battery.

### **Standard Power Supply**

The standard power supply furnished with the WAV-PK and WAV-PKM is shown in Figure 16. The power supply can be used for primary power or battery charging of the WAV-PKs or WAV-PKMs battery. Refer to the Battery Charging subsection in this manual for more information. The power supply barrel connector plugs into the side of the WAV-PK or the back of the WAV-PKM.

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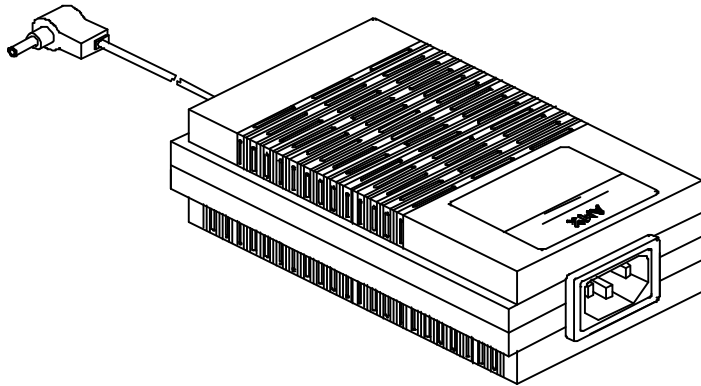
#### **Note**

The WAV-BP or WAV-BPM battery must be charged before use. Either battery will require a 4-hour charge.

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**Figure 16**

Power supply/battery charger

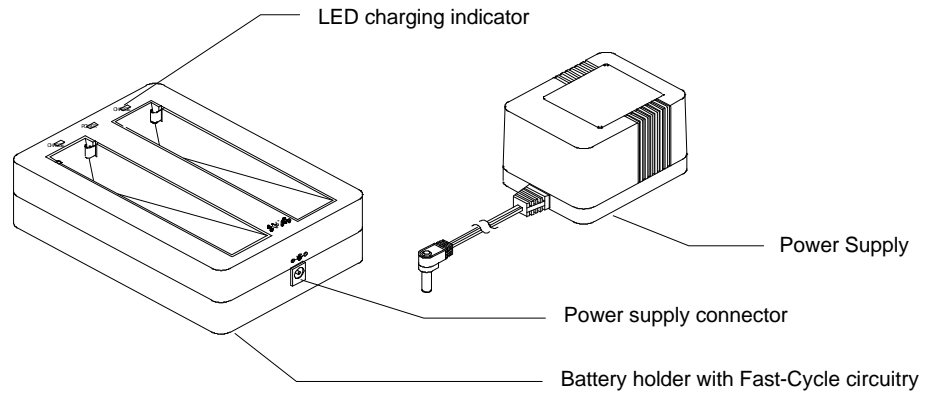


### Optional WAV-CHG Fast-Cycle Battery Charger

The WAV-CHG Fast-Cycle Battery Charger is shown in Figure 17. The charger will charge two batteries simultaneously. Refer to the Battery Charging subsection of this manual. The charger provides a fast-cycle, 4-hour, full-charge capability.

**Figure 17**

Optional battery charging  
holder and power supply





# Pre-Installation

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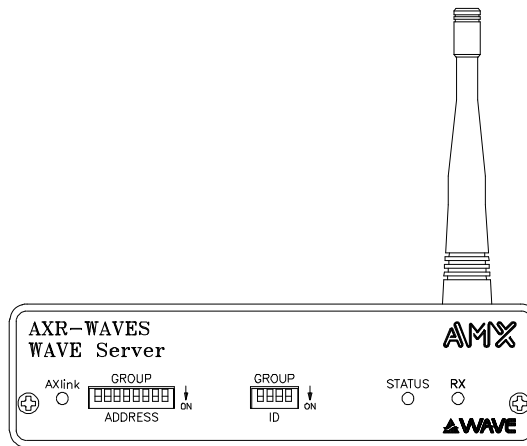
## Overview

Before installing the wireless communications equipment, set the AXR-WAVES GROUP ADDRESS DIP switch. Then, set the GROUP ID DIP switches for the AXR-WAVES, WAV-LNK, WAV-PK, and WAV-PKM. Figure 18 shows the DIP switches on the AXR-WAVES front panel.

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**Figure 18**

AXR-WAVES front panel



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### Note

Device numbers must fall within the device number range set on the AXR-WAVES.

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### Note

Settings of both DIP switches on the AXR-WAVES must match both DIP switch settings on the WAV-LNK for proper operation.

## AXR-WAVES (or WAV-LNK) Group Address DIP Switch

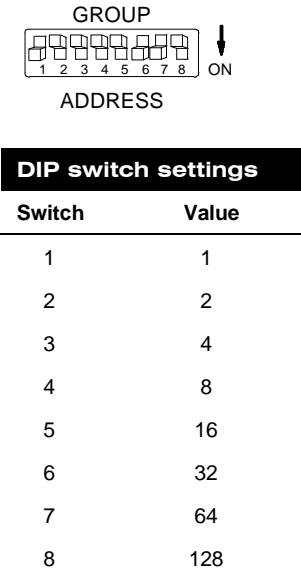
A single AXR-WAVES server can communicate with up to 16 wireless devices. The 8-position GROUP ADDRESS DIP switch sets the starting address (+ 15) for the group device numbers. For example, if the DIP switch is set to 128, the AXR-WAVES (or WAV-LNK) allocates device numbers 128 through 143 (128+15). The Group Address DIP switch setting on the WAV-LNK must be set identical to the Group Address switch setting on the AXR-WAVES server.

Device numbers for the WAV-PK and the WAV-PKM commonly begin at 128 and are set using touch-screen menus on the full-sized and mini-touch panels. Refer to the instruction manual supplied with your touch panel for detailed information.

Figure 19 shows the AXR-WAVES GROUP ADDRESS DIP (or WAV-LNK) switch and a quick reference for the DIP switch numbers and their values.

**Figure 19**

GROUP ADDRESS and DIP switch settings quick reference



### AXR-WAVES (or WAV-LNK) Group ID DIP Switch

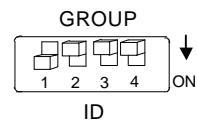
**Note**

The GROUP ID DIP switch setting must be identical on the server and the WavePack.

The four-position GROUP ID DIP switch sets the identification number to synchronize communication between the wireless devices and AXR-WAVES. Each AXR-WAVES must have a unique GROUP ID number. The maximum number of AXR-WAVES you can connect to a Central Controller is 16. When a WAV-PK or WAV-PKM falls within the device number range set on the AXR-WAVES GROUP ADDRESS DIP switch, it must also be set to the same GROUP ID number. The Group Address DIP switch setting on the WAV-LNK must be set identical to the Group Address setting on the AXR-WAVES server.

For example, if the AXR-WAVES (or WAV-LNK) GROUP ADDRESS DIP switch is set to 128 and the GROUP ID DIP switch is set to 1, the WAV-PK, WAV-PKM, or WAV-LNK devices 128 through 143 must have their GROUP ID DIP switch set to 1. If the AXR-WAVES GROUP ID number does not match the WAV-PK, WAV-PKMs, or WAV-LNK GROUP ID, they will not communicate properly. Figure 20 shows a GROUP ID DIP switch and a quick reference for the DIP switch numbers and their values.

**Figure 20**  
GROUP ID DIP switch and switch settings

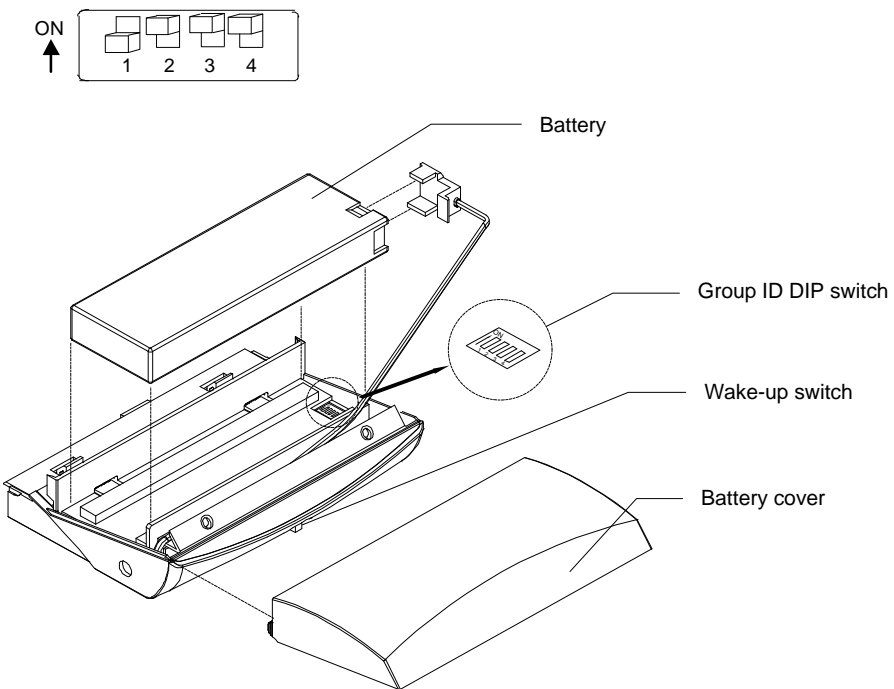


DIP switch settings	
Switch	Value
1	1
2	2
3	4
4	8

### WAV-PK Group ID DIP switch

The 4-position group ID DIP switch (Figure 21) sets the identification number to synchronize communication between the wireless WAV-PK and the AXR-WAVES (or WAV-LNK). Each AXR-WAVES (or WAV-LNK) must have a unique group ID number and each WAV-PK must have its 4-position group ID DIP switch set to the same value as the AXR-WAVES group ID value. The 4-position group ID DIP switch is located under the battery cover.

**Figure 21**  
WAV-PK group ID DIP switch



## WAV-PKM Group ID DIP switch

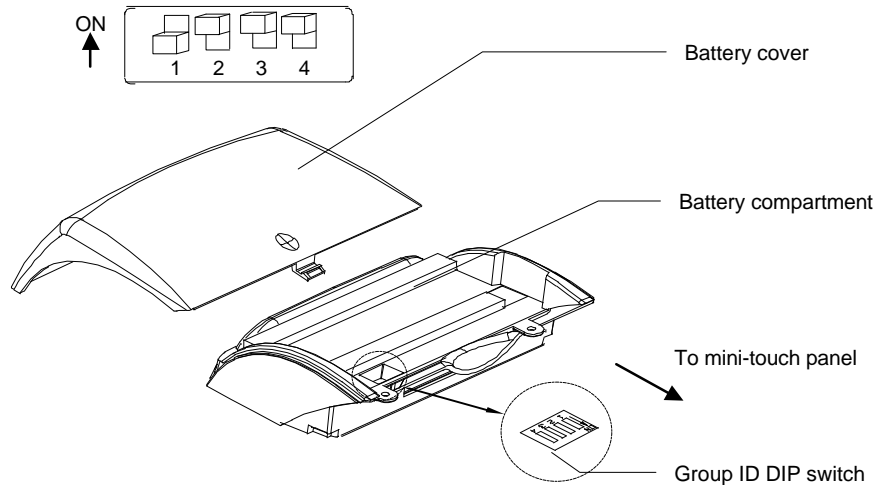
The 4-position Group ID DIP switch (Figure 22) sets the group identification number to synchronize communication between the wireless WAV-PKM and the AXR-WAVES (or WAV-LNK). Each AXR-WAVES (or WAV-LNK) must have a unique group ID number and each WAV-PKM must have its 4-position group ID DIP switch set to the same value as the AXR-WAVES group ID value.

If the AXR-WAVES (or WAV-LNK) and WAV-PKM group ID switches are not set to the same values, valid communications will not occur.

The group ID DIP switch for the WAV-PKM is located under the top cover of the unit. (To gain access to the DIP switch, refer to Installing the WAV-PKM subsection of this manual for gaining access to the DIP switch.)

**Figure 22**

WAV-PKM GROUP ID DIP switch location



### Note

The WAV-BP or WAV-BPM battery must be charged before use. Either battery will require a minimum 4-hour charge.

### Caution

Keep the following important safety considerations in mind when using the WAV-BP and WAV-BPM batteries:

- Do not incinerate.
- Do not directly connect the negative and positive terminals.
- Do not use with battery chargers other than the WAV-PK and WAV-PKM.

## Battery Charging

Charging the WAV-BP or WAV-BPM WavePack battery is accomplished with the battery still inside the WAV-PK (or the WAV-PKM), or by removing the battery and recharging it in the optional WAV-PM WaveLink Power Module (for WAV-BP batteries only), WAV-CHG Fast-Cycle Battery Charger, or the WAV-PM WaveLink Power Module. The WAV-PK and WAV-PKM have built-in charging circuitry and can recharge a battery in approximately 4 hours. Optionally, two batteries can quick-charge in a WAV-CHG Fast-Cycle Battery Charger is used (Figure 23).

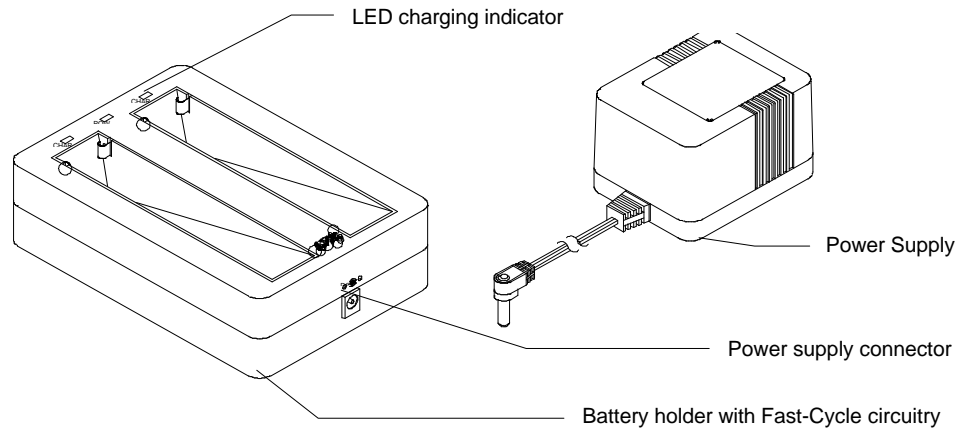
The optional WAV-CHG Fast-Cycle Battery Charger charges two batteries at the same time, or one at a time. With multiple batteries, you can use one battery and charge up to two more. The WAV-CHG produces a full charge for one or two batteries in approximately 4 hours.



Fully charged WAV-BP and WAV-BPM lead-acid batteries provide approximately 2-hours of continuous touch panel operation running at full LCD brightness. However, you can use the touch panel's sleep mode and LCD timeout features to significantly increase the operation time per charge. Refer to the touch panel's instruction manual to activate these features.

**Figure 23**

Optional WAV-CHG Fast-Cycle Battery Charger



### ***WAV-PM WaveLink Power Module***

In addition to being a power source, the WAV-PM WaveLink Power Module has built-in fast charging circuitry that will allow charging of a 12 VDC, 2.3 AH battery in approximately four hours.



## Sample control system

---

**Caution**

AXR-WAVES uses spread-spectrum signaling to avoid common problems associated with RF control. However, it's wise not to place AXR-WAVES components next to micro-wave ovens, spread-spectrum or consumer micro-wave video link transceivers, or projectors using Halide or Xenon lamps.

1. Mount the Central Controller in the position where it will be used. Connect the power supply.
2. Place the AXR-WAVES in the position where it will be used. The RF antenna should be set in a vertical position to communicate with the touch panels.
3. Position the touch panels, equipped with Wireless Power Packs, in the areas where they will be used.
4. Multiple AXR-WAVES can be used in the same local servers/groups (up to 16) as long as each has a different group address number.
5. Each server/group can contain up to 16 TiltScreens.

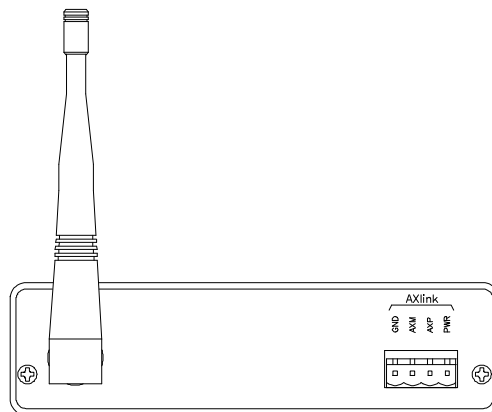
**Wiring the AXR-WAVES**

The AXR-WAVES rear panel contains an AXlink connector as shown in Figure 25.

---

**Figure 25**

AXR-WAVES connector

**Guidelines**

The AXR-WAVES requires 12 VDC power to operate properly. The power is supplied by the control system's AXlink cable. The maximum wiring distance between the control system and AXR-WAVES is determined by power consumption, supplied voltage, and the wire gauge used for the cable. Figure 26 lists wire sizes and maximum lengths allowable between the AXR-WAVES and control system. The maximum wiring lengths are based on a minimum of 13.5 volts available at the control system's power supply output.

---

**Caution**

Do not connect the AXlink cable to the AXR-WAVES yet. Disconnect the wiring from the CardFrame before connecting the AXlink cable to the AXR-WAVES. Apply power to the AXR-WAVES only when the installation is complete.

**Figure 26**

Wiring guidelines

Wiring guidelines	
Wire size	Maximum wiring length
18 AWG	1,174 feet
20 AWG	742 feet
22 AWG	463 feet
24 AWG	292 feet

Do not install the AXR-WAVES farther away from the control system than recommended in Figure 26.

**Preparing captive wires**

You will need a wire stripper and flat-head screwdriver to perform these steps. Prepare and connect the captive wires as follows.

**Caution**

Do not over-torque the screw. Doing so can bend the seating pin and damage the connector.

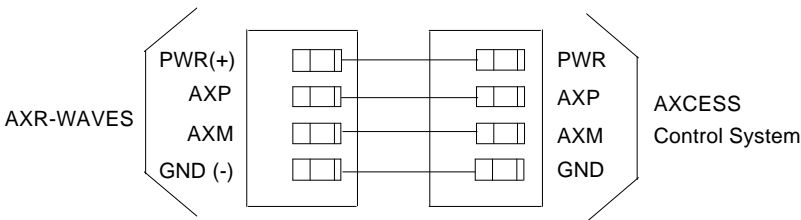
- 1. Strip .25 inch of wire insulation off all wires.
- 2. Insert each wire into the appropriate opening on the connector according to the wiring diagrams and connector types described in this section.
- 3. Turn the flat-head screws clockwise to secure the wire in the connector.

**Connecting AXlink for data and power**

Connect the control system’s AXlink connector to the AXlink connector on the rear panel of the AXR-WAVES for data and 12 VDC power, as shown in Figure 27.

**Figure 27**

AXlink data and power wiring diagram



## Installing the WAV-PK

The WAV-PK is installed in a full-sized touch panel as described in the following steps. The WAV-PK snaps into place and is self-retaining (Figure 28).

1. Fully open the rear connector cover on the full-sized tilt screen touch panel. Then, remove the touch panel connector cover by pushing gently on one side-edge towards the center of the cover (Figure 28). This will free one of the cover's swing arms from the housing's hinge pin. Then, push the cover gently in the opposite direction to free the other swing arm from its hinge pin.
2. Position the front of the WAV-PK into the control panel's connector compartment and align the unit's connector. Then, gently press the WAV-PK onto the control panel's connectors until the control panel's retaining tabs snap into place. Refer to the Black/White Touch Panels (Firmware version G3 or higher) instruction manual for more information on TiltScreen touch panels.

---

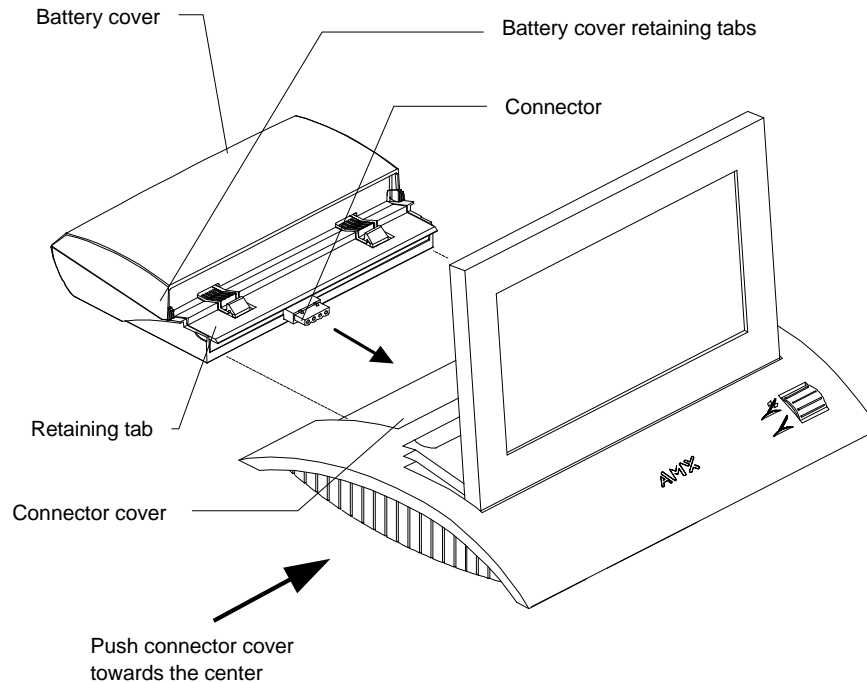
### Note

Do not use excessive force or pressure when removing the rear connector cover. Doing so will break the connector cover's retaining swing arms.

---

**Figure 28**

Installing the WAV-PK



---

**Note**

The WAV-PK or WAV-PKM battery must be charged for a minimum of 4-hours before use.

---

**Figure 29**

WAV-PK battery removal

---

**Caution**

Keep the following important safety considerations in mind when using the WAV-BP and WAV-BPM batteries:

- Do not incinerate.
  - Do not directly connect the negative and positive terminals.
  - Do not use with battery chargers other than the WAV-PK and WAV-PKM.
- 

**Warning**

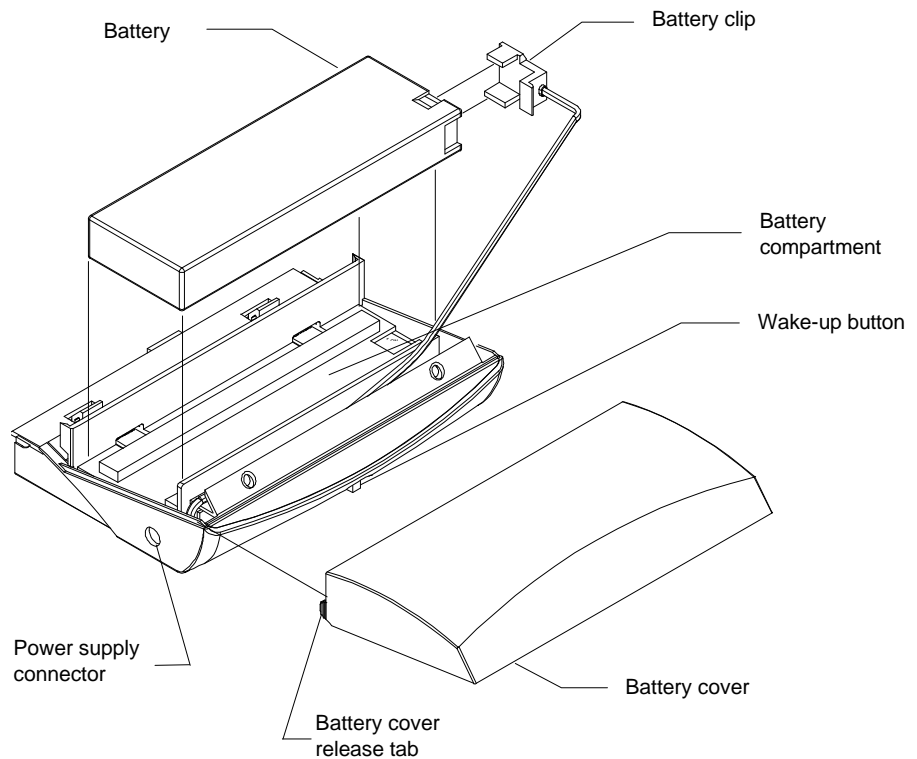
Do not drop or subject the battery to strong physical shock.

Do not use battery to power equipment other than the WAV-PK or WAV-PKM.

Do not use the battery below -10°C (15°F) or above +40°C (105°F). If the temperature exceeds this upper limit, a safety device automatically prevents operation of the battery.

**WAV-PK Battery Replacement**

Replace the WAV-PK battery (Figure 29) as follows.



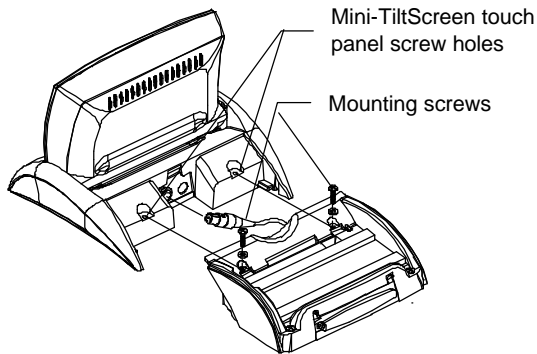
1. Remove the battery cover by pressing outward on each of the battery cover release tabs while lifting upward and backward at the same time.
2. Grasp the battery and lift it from the battery compartment. Then, pull the battery clip from the battery.
3. Install a charged battery by performing steps 2 and 1 in reverse.

## Installing the WAV-PKM

The WAV-PKM is secured with two screws once it is mounted to a Mini-TiltScreen touch panel (Figure 30). Refer to the Black/White Mini-Touch Panels (Firmware version G3 or higher) instruction manual for more information on Mini-TiltScreens. To install the WAV-PKM, perform the following steps:

**Figure 30**

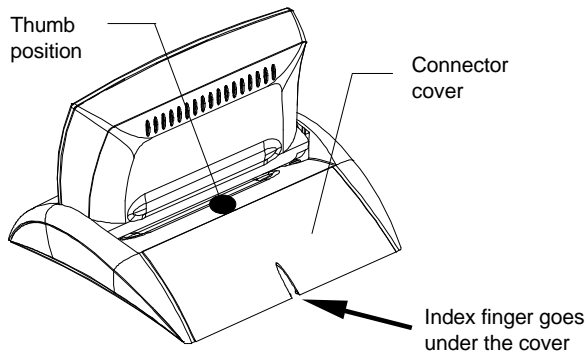
WAV-PKM mounting screws



1. Remove the mini-touch panel rear connector cover by placing your thumb on the mini-touch panel rear housing, and your index finger under the center of the rear connector cover as shown in Figure 31.

**Figure 31**

Removing the mini-touch panel rear connector cover



2. Press down with your thumb, and at the same time, lift up with your index finger. The cover will pop loose from the mini-touch panel housing.



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**Note**

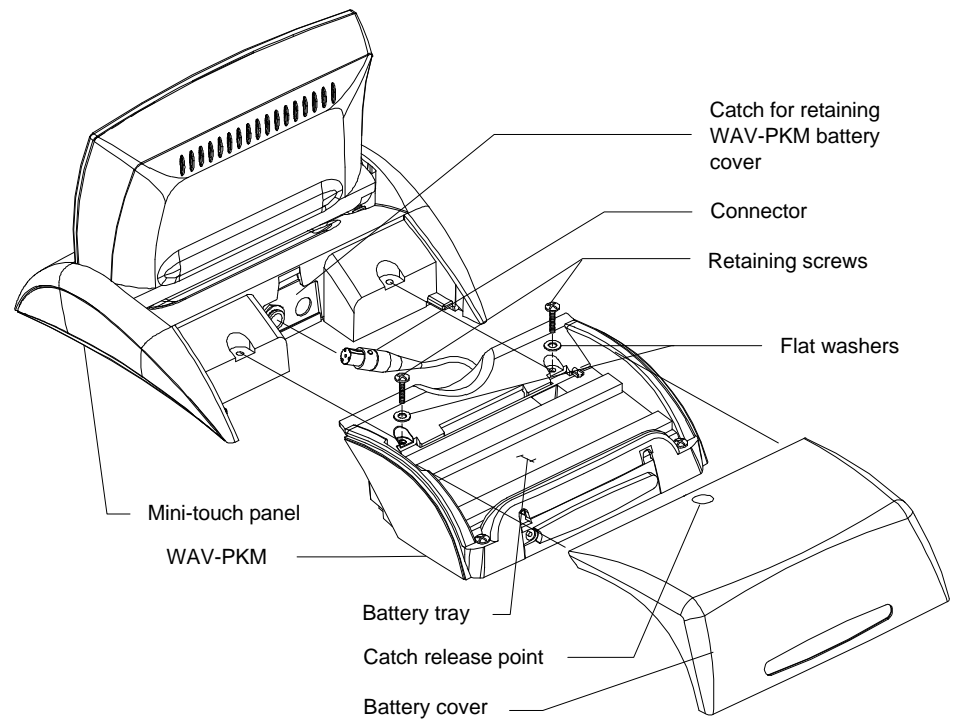
The WAV-PKM top cover is not attached to the WAV-PKM until after installation.

3. Insert the WAV-PKM connector cable into the connector on the rear of the mini-touch panel.
4. Position the WAV-PKM onto the rear of the control panel, aligning the WAV-PKM's screw holes with the mini-touch panel's screw holes. Then, using a Phillips screwdriver, secure the WAV-PKM to the control panel with two screws and two flat washers (Figure 32).
5. Position the WAV-PKM top cover on the unit and slide it toward the mini-touch panel until you hear a click, indicating that the cover is latched by the mini-touch panel catch (Figure 32).

---

**Figure 32**

WAV-PKM installation



---

**Note**

The WAV-BP or WAV-BPM battery must be charged for a minimum of 4-hours before use.

---

**WAV-PKM Battery Replacement**

To install or remove the WAV-PKM rechargeable battery, follow the steps below.

---

**Caution**

When disconnecting the battery, do not pull the battery connector clip off the battery by pulling on the wires. Pulling the clip by the wires will result in damage to the connections.

---

**Caution**

Keep the following important safety considerations in mind when using the WAV-BP and WAV-BPM batteries:

- *Do not incinerate.*
- *Do not directly connect the negative and positive terminals.*
- *Do not use with battery chargers other than the WAV-PK and WAV-PKM.*

---

**Figure 33**

Battery and battery clip

---

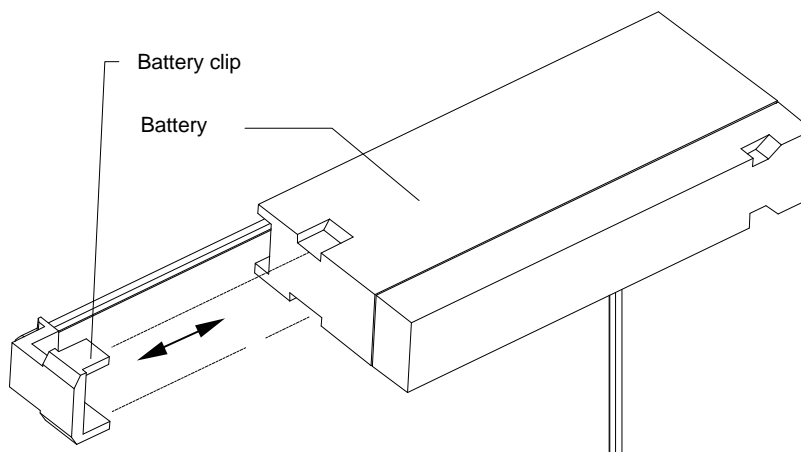
**Warning**

Do not drop or subject the battery to strong physical shock.

Do not use battery to power equipment other than the WAV-PK or WAV-PKM.

Do not use the battery below -10°C (15°F) or above +40°C (105°F). If the temperature exceeds this upper limit, a safety device automatically prevents operation of the battery.

1. Depress the catch release point on the WAV-PKM top cover where it joins the mini-touch panel (Figure 32).
2. While pressing downward, slide the top cover rearward and lift upward from the unit.
3. Lift the battery from the battery tray (Figure 33), grasp the plastic connector clip, and slide the connector clip off the battery.
4. Position the battery clip on the battery terminals (Figure 33) and make sure that the clip snaps into place
5. Place the battery on its side in the battery tray with the wires and battery clip facing the mini-touch panel.
6. Position the top cover over the unit and slide it forward until it clicks into place and is held securely.



To maximize the recharge life of the battery, do not completely discharge the battery, and recharge the battery immediately after use.

## Installing the WAV-PM

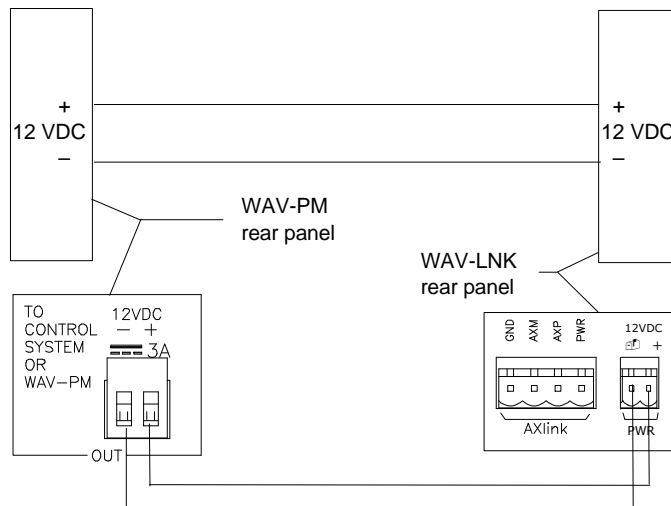
WAV-PM WaveLink Power Modules can be used singly or daisy chained for operation with a touch panel. A WAV-PM can be configured for two different hardware configurations, as described in the following paragraphs.

### Single WAV-PM module

When using a single WAV-PM to power a WAV-LNK, see Figure 34 for connections.

**Figure 34**

Single WAV-PM installation



### Multiple WAV-PM modules

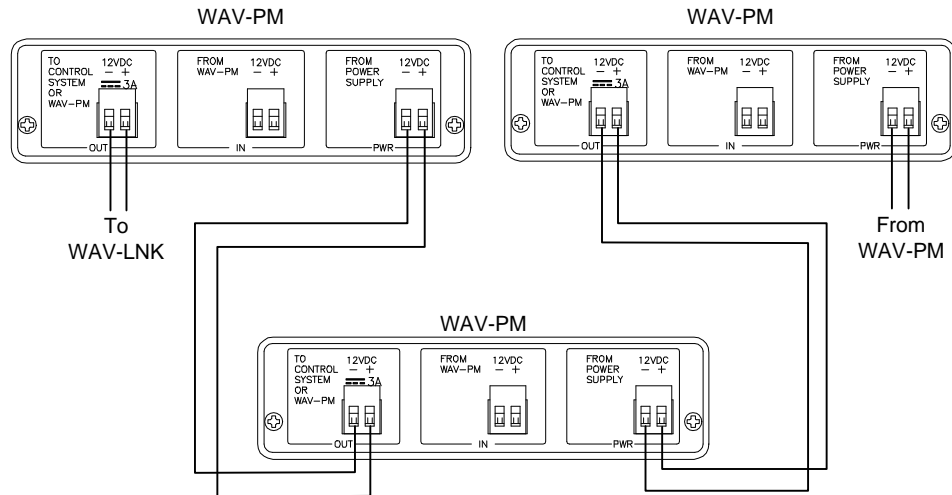
If you are using multiple WAV-PM modules, connect them as shown in Figure 35.

**Figure 35**

Multiple WAV-PM modules

**Note**

When using multiple WAV-PM modules, each WAV-PM must have its own power supply (PS4.2) plugged into the PWR connector for charging.



# Firmware Upgrades

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## Overview

Firmware upgrades allow you to install the latest available operating system for your AXR-WAVES or Wave Packs. This section provides the information required for removing an old firmware integrated circuit (ICs) and installing a new firmware upgrade IC.

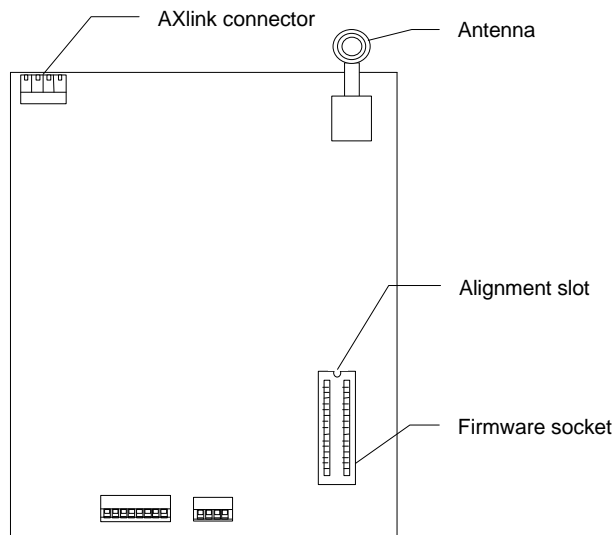
You will need a Phillips screwdriver and a non-conducting flat-blade tool to slip under the installed firmware IC to lift it up and out of the IC socket.

## AXR-WAVES Server Firmware

Upgrade of the AXR-WAVES firmware is accomplished by following the procedures below and as shown in Figure 36.

**Figure 36**

AXR-WAVES circuit board  
firmware socket



1. Disconnect the AXlink connector from the rear of the AXR-WAVES housing.
2. Using a small Phillips-head screwdriver, remove the two screws on each side of the AXR-WAVES housing cover.

---

**Caution**

Ground yourself before touching anything within the AXR-WAVES housing. If your body retains any static electrical charge and you touch the circuit board, severe damage will occur to the components mounted on the circuit board.

3. Remove the cover by lifting up while tilting the rear of the cover forward at the same time.
4. Using a non-conducting flat blade tool, pry the firmware chip from its socket by placing the non-conducting tool between the firmware chip and its mounting socket.
5. After removing the existing firmware chip, position the new firmware chip in the mounting socket. Ensure the alignment slots (on the firmware chip and the socket) are aligned (see Figure 36). Then apply sufficient pressure to the chip to seat it in the socket.
6. Replace the AXR-WAVES housing cover back on the housing and secure the cover with the four screws removed in step 1.

**WAV-PK Battery Pack Firmware**

Perform the following to replace the WAV-PK firmware IC.

1. Remove the WAV-PK battery cover by pressing outward on each of the battery cover release tabs while lifting upward and backward at the same time (see Figure 29).
2. Grasp the battery and lift it from the battery compartment. Then, pull the battery clip from the battery.
3. Turn the WAV-PK upside down and remove the four screws (Figure 37) holding the bottom cover to the top cover.
4. Remove the bottom cover by lifting up and forward at the same time (Figure 37), as the arrow (↑) shows. This will allow the bottom cover to clear the Wakeup button.
5. Lift the main circuit board and the connector board from the WAV-PK housing and turn them over (when the bottom cover is first removed, you are looking at the bottom of the main circuit board and it must be flipped).
6. Refer to Figure 37 for component location, then disconnect the antenna from the receiver/transmitter module, allowing unrestricted access to the firmware chip.
7. Using a non-conducting, flat-blade tool, pry the firmware chip from the strip sockets. See arrow (↑) for the position and direction placement for your non-conducting pry tool.

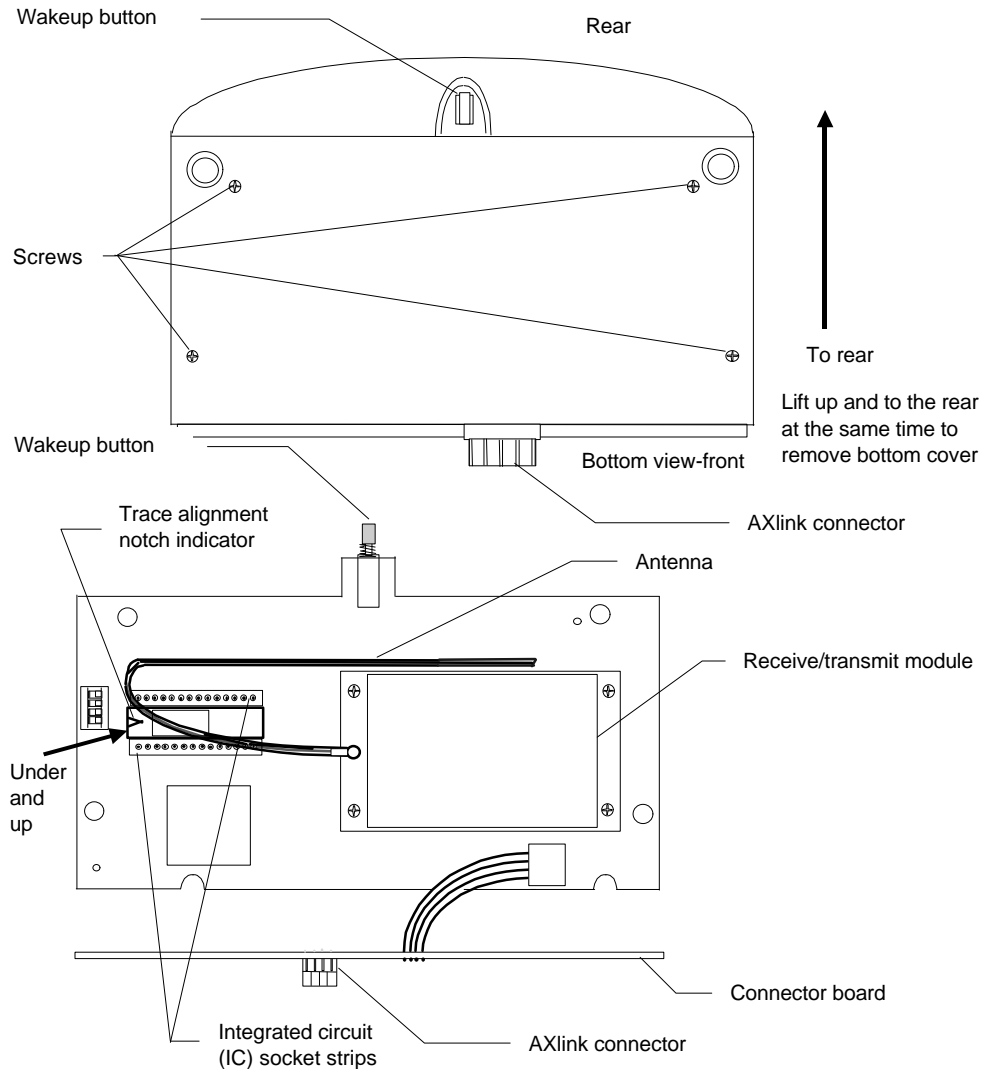
---

**Caution**

Use extreme care when prying the firmware chip from its strip sockets. The firmware chip sits on top of another integrated circuit and you may damage the lower circuit or destroy circuit board traces if care is not used.

**Figure 37**

WAV-PK bottom cover removal and circuit board component location



- 8.** After removing the old firmware chip, position the new firmware chip on the socket strips with the alignment notch over the top of the notch indicator on the circuit board trace.
- 9.** After positioning the firmware chip in the socket strips, apply sufficient downward pressure to seat the chip in the socket strips.

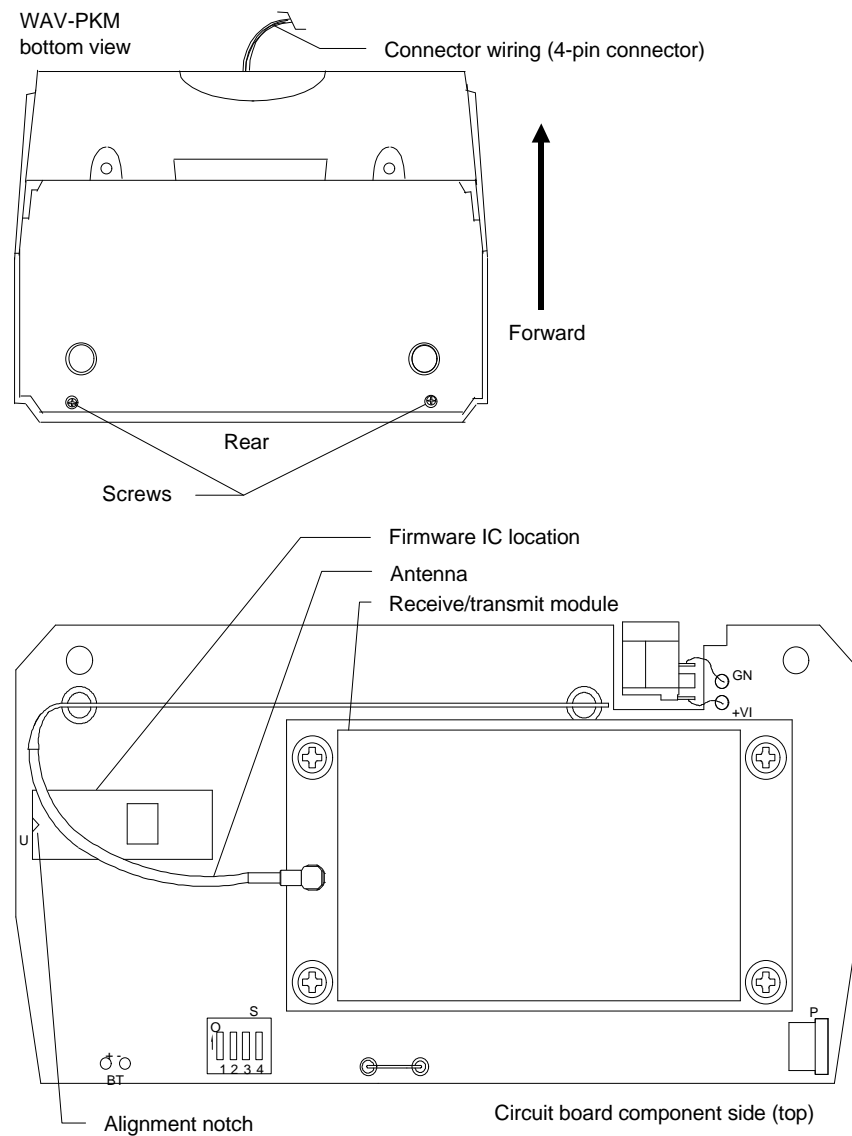
## WAV-PKM Battery Pack

Perform the following steps to replace the WAV-PKM firmware IC.

1. Remove the WAV-PKM from the touch panel and turn it upside down. Then, using a Phillips-head screwdriver, remove the two screws holding the bottom cover to the unit housing (Figure 38).
2. After removing the two bottom cover screws, slide the bottom cover forward while lifting the bottom cover rear edge upward at the same time.

**Figure 38**

WAV-PKM firmware IC location





---

**Caution**

Discharge any static electricity that you may have in your body to prevent possible damage to the WAV-PKM circuit board.

- 3.** After the bottom cover has been removed, lift the circuit board from the unit housing, then turn the circuit board over and place it on a flat surface with the component side up.
- 4.** Using a small, flat, non-conducting tool, pry the firmware IC from the IC socket.
- 5.** Position the new firmware chip in the circuit board IC socket and firmly press the IC into the socket.
- 6.** Reassemble the WAV-PKM by performing the reverse of steps 1 through 3.

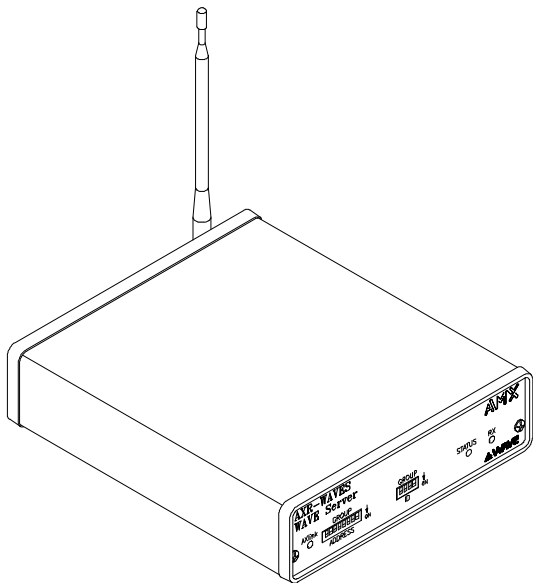


# Specifications

## AXR-WAVES

Figure 39 shows the AXR-WAVES. The specifications are in Figure 40.

**Figure 39**  
AXR-WAVES server



**Figure 40**  
AXR-WAVES specifications

AXR-WAVES specifications	
Power requirement	12 VDC
Power consumption	100 mA
Operating frequency	2.4 GHz (digital spread spectrum)
Indicators	<ul style="list-style-type: none"><li>• AXlink LED</li><li>• STATUS LED</li><li>• RX LED</li></ul>
Connector	4-pin AXlink captive wire connector
Enclosure	Metal with black matte finish
Weight	1.4 lbs (0.6 kg)
Dimensions	1.5" x 5.5" x 6.5" (38 mm x 140 mm x 165 mm)

WAV-PK

Figure 41 shows the WAV-PK. The specifications are in Figure 42.

Figure 41

WAV-PK wireless power pack

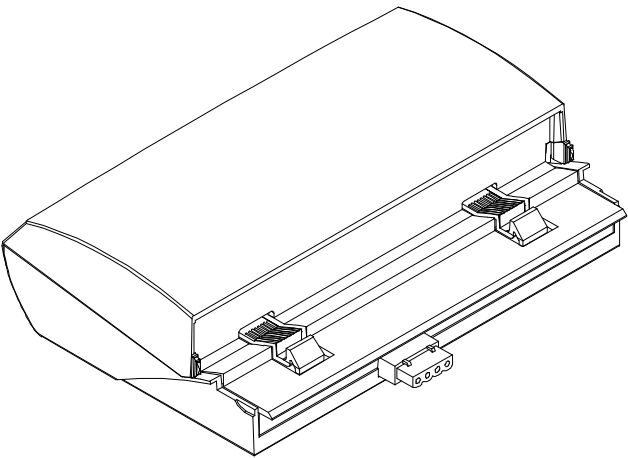


Figure 42

WAV-PK specifications

WAV-PK specifications	
Power requirement	12 VDC
Operating frequency	2.4 GHz (digital spread spectrum)
Connector	4-pin
Enclosure	Molded black matte plastic
Battery	Lead-acid
Weight	2.4 lb (1.1 kg)
Dimensions	2.0" x 7.5" x 5.5" (51 mm x 190 mm x 140 mm)

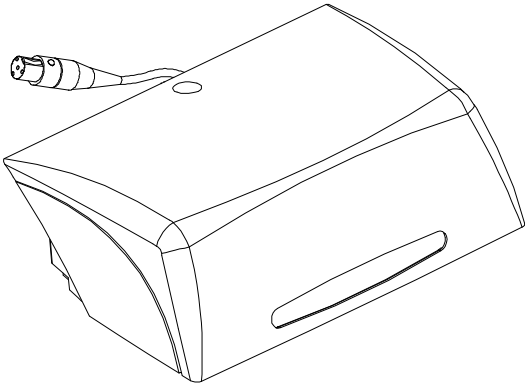
Note

For more information on the charge cycles available for this battery type, see Figure 15.

WAV-PKM

Figure 43 shows the WAV-PKM. The specifications are in Figure 44.

**Figure 43**  
WAV-PKM wireless power pack



**Figure 44**  
WAV-PKM specifications

**Note**  
For more information on the charge cycles available for this battery type, see Figure 15.

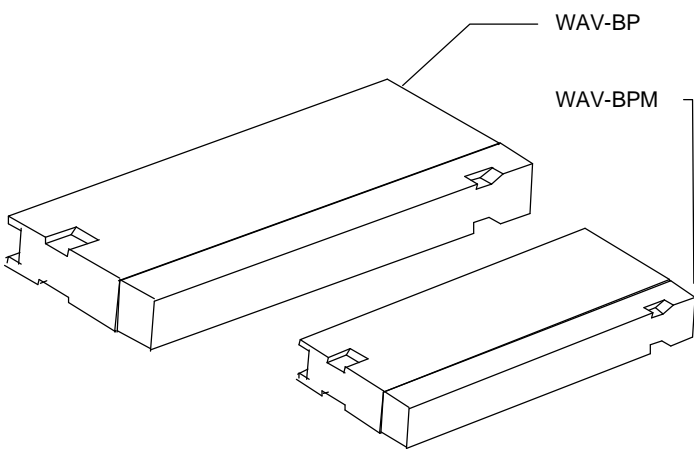
WAV-PKM specifications	
Power requirement	12 VDC
Operating frequency	2.4 GHz (digital spread spectrum)
Connector	4-pin
Enclosure	Molded black matte plastic
Battery	Lead-acid
Weight	2.0 lb (0.9 kg)
Dimensions	2.3" x 7.0" x 5.0" (57 mm x 178 mm x 127 mm)

WAV-BP and WAV-BPM Batteries

Figure 45 shows the WAV-BP and WAV-BPM batteries. Figure 46 shows the specifications.

**Figure 45**  
WAV-BP and WAV- BPM bat-  
teries

**Note**  
  
To maximize the recharge life  
of the battery, do not com-  
pletely discharge the battery,  
and recharge the battery im-  
mediately after use.



**Figure 46**  
WAV-BP and WAV-BPM  
specifications

WAV-BP and WAV-BPM specifications	
Battery voltage	12 VDC
Type	Sealed lead acid
Amp hour (Ah):	
WAV-WP	2.3 Ah
WAV-BPM	2.0 Ah
Weight:	
WAV-BP	22.8 oz (635 gm)
WAV-BPM	20.0 oz (590 gm)
Dimensions:	
WAV-BP	2.4" x 7.2" x 0.9" (61 mm x 183 mm x 24 mm)
WAV-BPM	2,6" x 5.6" x 0.9" (65 mm x 143 mm x 24 mm)
Model number:	
WAV-PK	WAV-BP
WAV-PKM	WAV-BPM

WAV-LNK WaveLink

Figure 47 shows the WAV-LNK transceiver and Figure 48 shows the specifications.

Figure 47  
WAV-LNK WaveLink

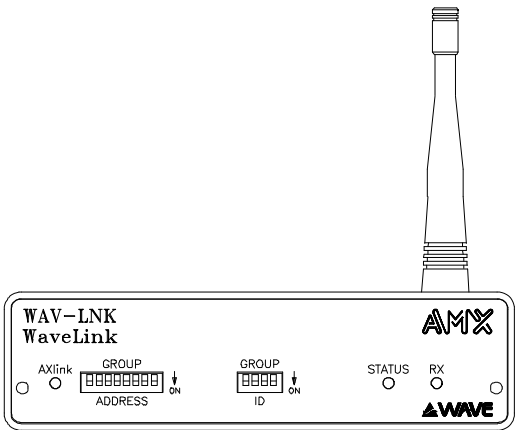


Figure 48  
WAV-LNK specifications

WAV-LNK specifications	
Power requirements	12 VDC
Power consumption	100 mA
RF Frequency	2.4 GHz digital spread spectrum
Enclosure	Metal with black matte finish
Connector	4-pin AXlink captive wire connector
Enclosure	Metal with black matte finish
Weight	1.4 lbs (0.6 kg)
Dimensions	1.5" x 5.5" x 6.5" (38 mm x 140 mm x 165 mm)

WAV-PM Power Module

Figure 49 Shows the WAV-PM Power Module and Figure 50 shows the specifications.

Figure 49

WAV-PM Power Module

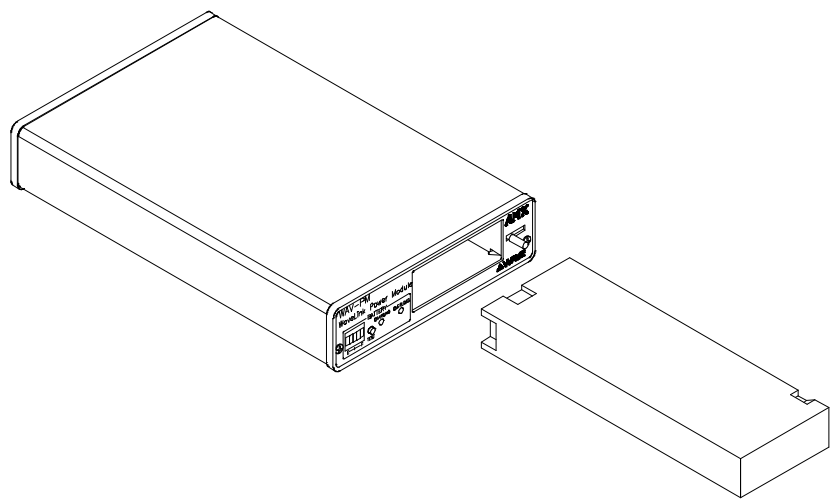


Figure 50

WAV-PM specifications

WAV-PM specifications	
Output voltage	12 VDC
Output current	3.0 AMP maximum
Input voltage	12 VDC
Recommended power supply	PS4.2 (4.2 A)
Weight	3.3 lbs (1.5 kg) with battery
Dimensions	1.5" x 5.5" x 9.5" (38 mm x 140 mm x 191 mm)
Enclosure	Metal with black matte finish
Connectors	<ul style="list-style-type: none"><li>One 2-pin PWR connector</li><li>One 2-pin IN connector</li><li>One 2-pin OUT connector</li></ul>
Options	<ul style="list-style-type: none"><li>12 VDC power supply</li><li>AC-RK Accessory Rack Kit</li></ul>



# Contacting Sales and Technical Support

## Overview

Customer service and satisfaction is our highest priority here at Panja Incorporated. If you are experiencing any problems or have a question about your product, please contact Technical Support or your regional Sales and Support Team for assistance.

## U.S. Sales and Technical Support Teams

To identify your regional Sales and Support Team, refer to the map shown in Figure 51.

**Figure 51**  
U.S. Sales and Support Team map

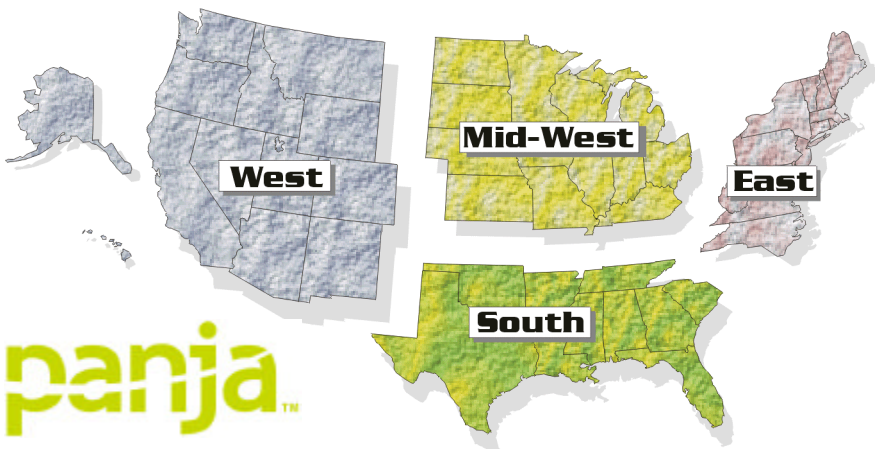


Figure 52 and Figure 53 lists contacts U.S. Sales and Support teams by region.

**Figure 52**  
U.S. Sales and Support Teams

U.S. Sales and Support Teams			
U.S. Team	Telephone	Fax	E-mail
West Team	800-552-6955	972-907-6222	West_Team@panja.com
Mid-West Team	800-852-6985	972-907-6224	Midest_Team@panja.com
South Team	800-752-6975	972-907-6220	South_Team@panja.com
East Team	800-462-6946	215-657-8799	Panja_East@panja.com

**Figure 53**

Other Panja contacts: Special Projects, Synergy and International Team contacts

Other Panja contacts			
	Telephone	Fax	E-mail
Special Projects	800-452-6945	972-907-6200	Special_projects@panja.com
Synergy	800-952-6995	972-644-1291	Synergy@panja.com
International Team	+1 972-907-6247 or +1 800-222-0193	+1 972-907-6213	International_Team@panja.com

### Panja International Offices

Figure 54 lists Panja International offices.

**Figure 54**

Panja International Offices

Panja International Offices		
	Telephone	Fax
Panja Singapore	+65 221-2045	+65 221-2089
Panja Canada - Calgary	+1 403-256-2232 +1 888-222-0193	+1 403-256-6106
Panja Canada - Toronto	+1 905-304-1839 +1 888-250-3983	+1 905-304-6783
Panja Mexico	+525-638-0007	+525-638-0825

### Technical Support

Panja, Inc. provides technical support by telephone, fax, E-mail, or bulletin board system (BBS). For the fastest possible service, please have the following information ready, or provide it in your fax or E-mail message:

- Your name, company name, mailing address, and telephone number
- The name of your authorized Distributor or Dealer
- Dealer ID
- Job Title
- Purchase Order #
- Sales Order #

In addition to the general information listed above, it is necessary for your Technical Support representative to know the nature of your service problem. The more information you provide initially, the faster your representative can resolve the problem. With this in mind, please have the following information at hand.

- **If you are having a problem with hardware** — identify the equipment/firmware version you are using, what you were doing when the problem occurred, and any troubleshooting you've tried (if any).
- **If your problem is with a software program** — identify the program you are using and the version number, the operating system on your PC, what you were doing when the problem occurred, and any troubleshooting you've tried (if any).

Figure 55 lists the contact numbers for Technical Support

**Figure 55**

Technical Support

Technical Support		
	Telephone	Fax
U.S. and Canada (Dallas Office)	800-932-6993	972-907-6214
U.S. East Coast region (Philadelphia office)	800-462-6946	215-643-2808
		215-657-8799
Technical Support BBS	972-907-2884	bbs.panja.com



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